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DIMENSIONS OF TEACHER'S ATTITUDES TOWARD INSTRUCTIONAL MEDIA.

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TEACHERS' RATINGS ON SIX 7-POINT SEMANTIC DIFFERENTIAL SCALES (GOOD-BAD, WORTHLESS-VALUABLE, FAIR-UNFAIR, MEANINGLESS-MEANINGFUL, WISE-FOOLISH, DISREPUTABLE-REPUTABLE) WERE OBTAINED FOR THE FOLLOWING TERMS--AUTOMATED INSTRUCTION, SELF-INSTRUCTIONAL PROGRAM, TEACHING MACHINE, MECHANIZED TUTOR, PROGRAMED TEST, PROGRAMED INSTRUCTION, TUTOR TEXT, WORK TOOLS, EXERCISE BOOK, FILMSTRIP, AUDIOVISUAL EDUCATION, FLASHCARD, TEXTBOOK, TV TUTOR, EDUCATIONAL TECHNOLOGY, EDUCATIONAL TELEVISION. FACTOR ANALYSIS OF THE 179 RATINGS YIELDED THREE FACTORS--(1) PROGRAMED INSTRUCTION, (2) TRADITIONAL TEACHING AIDS, AND (3) AUDIOVISUAL DEVICES. HOWEVER, THE FACTORS OF PROGRAMED INSTRUCTION AND AUDIOVISUAL DEVICES WERE ALSO CONSIDERED TO INDICATE THE DEGREE TO WHICH A TERM CONNOTES REPLACEMENT OF THE TEACHER'S INSTRUCTIONAL FUNCTION BY MACHINE OR AUTOMATION. TRADITIONAL TEACHING AIDS ON THE OTHER HAD, APPEARED TO REFLECT THE DEGREE TO WHICH TEACHERS FEEL A DEVICE IS LIKELY TO BE USED BY THEM, RATHER THAN INDEPENDENTLY OF THEM. DEVICES LOADING ON FACTOR TWO, TRADITIONAL TEACHING AIDS, WERE VIEWED MORE POSITIVELY BY TEACHERS. THE AUTHOR CONCLUDED THAT TEACHERS HAVE SIGNIFICANTLY LESS FAVORABLE ATTITUDES TOWARD TERMS WHICH DIRECTLY CONNOTE AUTOMATION THAN THEY DO TOWARD COMPARABLE TERMS THAT ARE NOT IDENTIFIED WITH AUTOMATION. THIS FINDING IS INTERPRETED IN TERMS OF THREAT. THIS PAPER WAS PRESENTED AT THE EASTERN PSYCHOLOGICAL ASSOCIATION CONVENTION (BOSTON, APRIL 1967). (LC)

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Dimensions of Teachers' Attitudes Toward Instructional Media [1]

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Introduction of the newer educational media into the schools constitutes both an opportunity and a threat to the classroom teacher. Much has been written concerning the opportunities afforded to the teacher by audio-visual and programed devices with respect to improving the effectiveness of instruction, its vividness, and the individualization of instruction. Less writing and research has appeared about the possibility that newer media, especially those of the automated variety, constitute a threat to the teacher due to the possibility that they would replace his instructional function.

Previous research on teachers' attitudes to programed instruction and other media has provided supporting evidence for the hypothesis that teachers are threatened by the introduction of automated devices into the classroom. Tobias (1963) investigated teachers' attitudes toward three groups of terms. One set of terms described traditional teaching aids such as flashcards, workbooks and exercise books. The other two sets of terms both described materials connected with programed instruction; one group of terms described these materials with labels stressing automation and mechanization (automated instruction, mechanized tutor, and teaching machine), and the other set of terms omitted the implications of automation (programed instruction, programed text, and tutor text). The results indicated that the least favorable attitudes were expressed concerning the terms connoting automation, followed by the programing terms, with the traditional terms receiving the most favorable responses. Significant differences were found between essentially

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synonymous terms differing only in the degree to which they connoted automation.

A further study (Tobias, 1966) attempted to determine more directly the degree to which fear of automation, and other variables affected teachers' attitudes toward instructional media. In that study, three terms drawn from the field of audiovisual education were added to the terms used in the prior study. Three groups of terms, the audiovisual, automated, and programing, contained one term using the word "tutor" as a suffix or prefix, i.e. TV tutor, Mechanized tutor, Tutor text. It was reasoned that since these terms most explicitly connoted replacement of the teacher's function, teachers ought to have the most negative reaction to them if a fear of automation was variable in teachers' attitudes to newer media. This prediction was dramatically confirmed by the findings.

In both prior investigations a particular term had been held to belong to the audiovisual group, or the programing group for example, on the basis of the content of the word. Inspection of the attitude score means, however clearly suggested that with respect to teachers' attitudes the terms might well form different clusters than suggested on the basis of their content. One of the purposes of the present study was, therefore, to determine empirically the groupings of the various terms with respect to teachers' attitudes, by submitting the attitude ratings to factor analysis. A further purpose was to ascertain whether a factor which could be identified with automation emerged from the factor analysis. A final aim of this study was to determine the consistency of teachers' attitudes over three years by correlating the attitude score findings of the prior studies with those of the present investigation.

Subjects & Procedures.

A total of 179 teachers served as subjects (Ss) in this study. All Ss were tested in graduate education courses which they attended during the spring and summer of 1965. The sample was composed of 89 elementary school

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teachers, 75 junior high school teachers, and 9 high school teachers. There were 115 women in the sample, and 64 men. The mean age for the sample was 28.8, with an SD of 3.5. The mean years of teaching experience for the Ss was 4.8.

The Ss were asked to rate their attitudes toward 16 terms describing instructional media on six scales drawn from the semantic differential (Osgood, 1957) for their high saturations on the evaluative factor, and negligible loadings on the other factors. The terms, reproduced in Table I, appeared at the top of a page succeeded by the following semantic differential scales: Good-Bad, Worthless-Valuable, Fair-Unfair, Meaningless-Meaningful, Wise-Foolish, Disreputable-Reputable. The positive and negative poles were varied to avoid positional bias. Ss were asked to respond to the scales by instructions adapted from Osgood (1957,p.82).

The terms describing instructional media were ordered into a sequence by means of a table of random numbers. Once the sequence was established the booklets were collated by beginning with a different term in each booklet. This procedure was intended to vary the order of appearance of each term within the randomly established sequence. Ss were instructed to rate their attitudes towards all terms according to their feelings about them, even if they did not recognize a particular term.

Results and Discussion. The semantic differential scales were assigned scores of seven for the positive pole of each scale, to 1 for the negative pole. The scale scores for each term were then added, giving rise to a maximum score of 42 for each term, and a minimum score of 7. Subjects who ommitted any scale, or term, were excluded from the analysis.

The scores for each of the 16 terms were then intercorrelated, and subjected to a principal components factor analysis. Factor extraction was terminated after the third factor when the eigen-value fell below 1.00.

The correlation matrix, Table 3, and principal components loadings, Table 4, are appended to this report. The results of the factor analysis were then subjected to rotation by the varimax method, and the rotated factor loadings appear in Table 1.

Insert Table 1 about here

Inspection of the rotated factor loadings indicated that terms dealing with programed instruction, whether they stressed automation or not, had their major loadings on factor 1. In view of the fact that programed instruction terms constituted half of the terms it is not surprising that this factor accounts for the largest percentage of the variance. However, inspection of the factor loadings indicates that factor 1 cannot be interpreted exclusively in terms of programed instruction in view of the loadings Educational television (.34), Exercise book (.28), and TV tutor (.26) have on this factor.

Factor 2 is most highly saturated by terms describing traditional teaching aids. It is, however, apparent that this factor can not be interpreted only in terms of traditional devices in view of the loadings of .66 for audio-visual education, and .40 for programed instruction on this factor. Factor 3 has its highest saturations with terms describing audio-visual devices. It is, however, also clear that this factor does not merely reflect audiovisual materials when the loadings of programed instruction (.31) and mechanized tutor (.30) on this factor are considered.

It would appear that the most accurate identification of what factors 1 and 3 represent is to consider each one a compound of two attributes: the content area from which the terms are drawn (programed instruction, or audio-visual education), and the degree to which it connotes replacement of the teacher's instructional function by machine- or automation- for brevity's sake. Factor 2, on the other hand, appears to reflect the degree to which teachers feel a device is likely to be used by them, rather than independently

of them, irrespective of what area the term's content connotes. Factor 2, thus, becomes an absence of automation factor. This identification clarifies the fact that such apparently different materials as workbook and exercise book on the one hand, and filmstrip and audiovisual education on the other hand all have their highest loadings on factor 2. All of these are used as an aid by the teacher, not without him. Automated instruction, teaching machines, or TV tutors, however, are seen as being used in the absence of the teacher, accounting for their moderate loading on the other factor (1 or 3) involving automation, in addition to their principal loadings on the factor reflecting the content from which they are drawn.

Such an interpretation suggests that from the teachers' point of view the term programed instruction, with a loading of .40 on factor 2, has a much greater degree of similarity to other teaching aids used by the teacher than do terms like automated instruction, teaching machine, or mechanized tutor. Correspondingly, in the field of audiovisual education, terms like audiovisual education and filmstrip are viewed by teachers as being similar to traditional teaching aids, while educational television and TV tutor are not. The latter terms were, in fact, seen as having marked implications of being used independently of the teacher as seen by their high loadings on one of the factors partially associated with automation, and low level loadings on the other factor. It is ironic to note that the term educational technology, which is used in the literature to describe programed and audiovisual devices, is viewed by teachers as most similar to audiovisual terminology, and having little relationship to programed instruction.

An alternative interpretation of the factor structure in terms of the degree to which teachers have experience with the devices appears possible.

This interpretation would suggest that factors 1 and 3 represent new materials with which teachers have little experience, whereas factor 2 is saturated with the devices with which the teacher has extensive familiarity due to its usage in the schools. Such an interpretation would not seem adequate to deal with the fact that the piece of equipment with which every teacher has had the widest experience, the textbook, of course, has only a moderate loading on factor 2. The interpretation that factor 2 reflects devices used under the teacher's supervision would lead one to expect only moderate loadings for textbook on this factor, since it is frequently used without the teacher's supervision. Furthermore, the difference in loadings on factor 2 between educational television (.11) and audiovisual education (.66) would be hard to explain purely in terms of experience, and is certainly more readily accounted for by the fact that the former has connotations of being used by the teacher in the classroom, and the latter does not.

In view of the fact that both factors 1 and 3 were held to represent automation to some degree it is interesting to compute the grand means for each factor. The means, and SDs for each term are given in the last data column of Table 2. By adding up all the means for those terms having their major loadings on any one factor, a grand mean for each factor was obtained. The grand mean for factor 1 was 30.1 and that for factor 3 was 30.9, confirming the assumed similarity between these two factors. Factor 2, on the other hand, had a grand mean of 33.8, indicating that in general the devices loading highly on this factor were viewed more positively by teachers. The means for each term were ranked, and a Kruskal-Wallis one way analysis of variance was computed in order to determine the significance of the difference in means among the factors. This analysis gave rise to an H of 14.05, significant beyond the .001 level. This finding confirmed previous results (Tobias, 1963;1966)

indicating that teachers have significantly less favorable attitudes toward terms which directly connote automation than they do to comparable terms which are not identified with automation.

Table 2 gives the mean values for each term obtained in the present study, and also presents the means of those terms which were employed in prior investigations. Rank order correlations were computed between the terms employed in each study by ranking the means for all the terms. The results indicated that for the nine terms used in the first study (1963) and in the present investigations the correlation was .85. For the 12 terms employed in the second study (1966), and at present, the correlation was .88. These results indicate that there is a good deal of consistency between the patterns of attitudes toward the various terms. At the present time, inspection suggests that the attitudes toward programing the terms has become somewhat more positive over the four year period.

As indicated in prior investigations, this study offers continuing support for the idea that the threat of automation is of some importance in the attitudes of teachers to educational media. The importance of the findings is not to be minimized in view of the fact that teachers are capable of making their feelings into self-fulfilling prophecies. Teachers who dislike certain kinds of materials are likely to affect the achievement of their pupils by the use of such materials in a negative way, thus ending up with "evidence" to support their previously held biases. These considerations imply that attention should be paid to these attitudes when the teacher first comes into contact with newer media, before the attitudes become solidified and finally self-perpetuating.

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Table I. Rotated Factor Loadings for All Terms, and Percentages of Common and Total Variance for Each Factor.

Terms	Factor I	Factor II	Factor III
Automated Instruction	.77	.03	.27
Self-instructional Program	.71	.11	-.02
Teaching Machine	.71	.08	.29
Mechanized Tutor	.66	-.05	.30
Programed Text	.66	.25	.31
Programed Instruction	.64	.40	.16
Tutor Text	.46	.38	-.10
Workbook	.18	.77	-.20
Exercise Book	.28	.76	-.18
Filmstrip	-.06	.69	.46
Audio-Visual Education	-.04	.66	.50
Flashcard	.16	.53	.23
Textbook	.03	.48	.15
TV Tutor	.26	.04	.67
Educational Technology	.21	.08	.66
Educational Television	.34	.11	.46
Percent Common Variance	40	35	25
Percent Total Variance	22	19	13

Table II. Attitude Score Means of Teachers to Instructional Terms Employed in Three Studies.

Terms	1963 Study N=26-50*	1966 Study N=115	1967 Study N=179
Flashcard	31.8	30.9	32.3
Exercise Book	33.3	33.2	32.0
Workbook	33.8	34.9	33.2
Textbook			34.0
Programed Text	30.3	30.1	32.2
Tutor Text	28.6	27.8	30.0
Programed Instruction	31.7	31.9	33.2
Self-instructional Program			30.6
Teaching Machine	26.1	28.0	30.2
Automated Instruction	23.8	25.7	28.4
Mechanized Tutor	22.2	23.9	26.1
Educational Technology			30.4
Audio-visual Education		37.5	36.3
Educational Television		34.2	31.6
TV Tutor		29.2	30.6
Filmstrip			35.1

* N's varied for each term.

Table 5

Variable Name	Factor I Factor Loading	Factor I Eigen-vector	Factor II Factor Loading	Factor II Eigen-vector	Factor III Factor Loading	Factor III Eigen-vector
1. Flashcard	0.53092	0.22550	0.31054	0.21597	0.07829	0.06743
2. Exercise Book	0.54152	0.23900	0.51625	0.35905	-0.36225	-0.31200
3. Workbook	0.46685	0.20604	0.57917	0.40281	-0.32984	-0.28408
4. Textbook	0.35781	0.15792	0.34952	0.24309	-0.07243	0.06238
5. Programed Text	0.74044	0.32679	-0.19532	-0.13584	-0.06174	-0.05317
6. Tutor text	0.48723	0.21504	0.09212	0.06407	-0.33790	-0.29102
7. Programed Instruction	0.74684	0.32962	-0.03229	-0.02246	-0.19282	-0.16607
8. Self-instructional Program	0.55145	0.24338	-0.28063	-0.19157	-0.36175	-0.31156
9. Teaching Machine	0.67133	0.29629	-0.36832	-0.25616	-0.08208	-0.07069
10. Automated Instruction	0.67785	0.29917	-0.43132	-0.29998	-0.12561	-0.10818
11. Mechanized Tutor	0.57144	0.25220	-0.45333	-0.31529	-0.04284	-0.03689
12. Educational Technology	0.48243	0.21292	-0.16767	-0.11661	0.46995	0.40476
13. Audio-visual Education	0.55784	0.24620	0.46429	0.32291	0.39535	0.34050
14. Educational Television	0.51537	0.22746	-0.18392	-0.12792	0.24958	0.21495
15. TV Tutor	0.49675	0.21924	-0.23394	-0.16270	0.46365	0.39933
16. Filmstrip	0.54129	0.23890	0.51084	0.35528	0.36319	0.31280
Percent of Variance	32.09		12.92		8.43	

Table 4

CORRELATION MATRIX OF ATTITUDES TO MEDIA

CORRELATION MATRIX SECTION 1

VARS.	Flashcard	Exercise book	Workbook	Textbook	Programed text	Tutor text	Programed instruction	Self-instructional program
ROW	1	2	3	4	5	6	7	8
1	1.0000	0.3607	0.3266	0.2830	0.2939	0.2187	0.2511	0.1314
2		1.0000	0.6379	0.2772	0.2874	0.3448	0.4422	0.1930
3			1.0000	0.1836	0.1830	0.3103	0.3038	0.1933
4				1.0000	0.2805	0.1772	0.2189	0.1251
5					1.0000	0.3078	0.6234	0.4374
6						1.0000	0.2894	0.2769
7							1.0000	0.4110
8								1.0000

Table 4

CORRELATION MATRIX OF ATTITUDES TO MEDIA

SECTION 2

CORRELATION MATRIX

Name	Teaching machine	Automated instruction	Mechanized tutor	Educational technology	Audio-visual education	Educational television	TV tutor	Filmstrip
ROW	9	10	11	12	13	14	15	16
1	0.2944	0.1850	0.1728	0.1802	0.3140	0.1738	0.2360	0.3476
2	0.2150	0.1543	0.1160	0.1029	0.3476	0.1549	0.0595	0.3172
3	0.1618	0.1239	0.0604	0.0490	0.3713	0.0739	0.0542	0.3857
4	0.0334	0.0898	0.0347	0.0929	0.2152	0.1148	0.1608	0.3072
5	0.4919	0.5397	0.3830	0.3427	0.2744	0.3263	0.3605	0.2436
6	0.1538	0.3414	0.2276	0.1819	0.1550	0.2374	0.1050	0.1796
7	0.5277	0.4996	0.3493	0.2248	0.3687	0.3180	0.2452	0.3285
8	0.4403	0.4526	0.3702	0.1487	0.0758	0.1848	0.2093	0.1492
9	1.0000	0.5279	0.5586	0.2920	0.2096	0.2928	0.3364	0.1698
10		1.0000	0.5342	0.3199	0.1820	0.4235	0.2841	0.1302
11			1.0000	0.2740	0.1346	0.2573	0.3264	0.1327
12				1.0000	0.2778	0.2737	0.3877	0.2586
13					1.0000	0.2728	0.2181	0.7152
14						1.0000	0.3389	0.1888
15							1.0000	0.2086
16								1.0000

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